South Carolina

Department of Health and Environmental Control

Bureau of Air Quality

Notice of MACT Approval

for

Santee Cooper (Pee Dee Generating Station)
Florence County, South Carolina

September 23, 2008

Notice of MACT Approval

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Florence County, South Carolina

This review was performed by the Bureau of Air Quality of the South Carolina Department of Health and Environmental Control in accordance with South Carolina Regulations for National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories.

September 23, 2008

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Time Line (Air Permitting Action History)

June 30, 2008	Santee Cooper submitted to South Carolina Department of Health and Environmental Control (DHEC), Bureau of Air Quality, a Case-by-Case 112(g) Maximum Achievable Control Technology (MACT) Application for the proposed Pee Dee Generating Station.
July 2, 2008	DHEC requested by phone that Santee Cooper submit a copy of the spreadsheet containing calculations for all the facilities rather than just the examples included in the appendix of the application.
July 8, 2008	DHEC forwarded a copy of Santee Cooper's 112(g) application to EPA Region 4.
July 16, 2008	DHEC received a Variability Analysis PDF file of the requested calculations for all facilities referenced in the application.
July 22, 2008	DHEC held a Public Meeting (Question and Answer Session) in Pamplico, SC to allow the general public to ask questions about this application. DHEC personnel from the Bureau of Air Quality, Bureau of Disease Control, and the Bureau of Water were represented to answer questions. A Santee Cooper representative was also present to answer questions.
July 30, 2008	DHEC received from Santee Cooper information on Santee Cooper Cross Generating Station Mercury emission analysis.
August 5, 2008	Santee Cooper and Trinity Consultants conducted a phone/webinar meeting with DHEC to review the calculations contained in the application and subsequent Variability Analysis document.
August 12, 2008	DHEC requested Santee Cooper submit several documents referenced in the application, in addition to respond to specific questions.
August 13, 2008	DHEC received from Santee Cooper requested information about their review of case-by-case determinations at other facilities, details about Electro-Catalytic Oxidation technology and their review of other states' limits.
August 15, 2008	DHEC received from Santee Cooper information regarding similar sources and other requested documents.
August 19, 2008	DHEC notified Santee Cooper by letter that the 112(g) application was

	deemed complete on this date.
August 25, 2008	Santee Cooper and Trinity Consultants met with DHEC to further discuss the calculations and premises included in the application.
September 4, 2008	DHEC requested by two separate emails to Santee Cooper additional information regarding the 112(g) application.
September 9, 2008	Santee Cooper submitted by email responses to additional information requests.
September 11, 2008	DHEC requested by email to Santee Cooper additional information regarding the 112(g) application.
September 15, 2008	DHEC met with Santee Cooper to discuss various aspects of the application.
September 15, 2008	Santee Cooper submitted by email responses to additional information requests.
September 17, 2008	DHEC, Santee Cooper, Trinity Consultants held a conference call to discuss various aspects of the application.
September 19, 2008	DHEC and Santee Cooper held a conference call to discuss various aspects of the application.
September 23, 2008	DHEC placed the Notice of MACT Approval (NOMA) on public notice for a 45-day comment period by publication in the *Florence Morning News*, *The Sun News*, and *The State* newspapers. A public hearing was also scheduled at this time to receive oral and written comments on NOMA. The public hearing was scheduled for October 23, 2008, in the gymnasium of Hannah-Pamplico High School located at 2055 South Pamplico Highway in Pamplico, South Carolina. Interested persons who were in attendance at the previous meetings and/or those who have requested to receive updates or be added to the mailing list were notified of the public notice, public comment period and public hearing. All required Federal and State officials were notified as well. The public comment period ends November 6, 2008.

Introduction

On May 31, 2006, Santee Cooper submitted a Prevention of Significant Deterioration construction permit application to the South Carolina Department of Health and Environmental Control, Bureau of Air Quality, subsequently referred to as Department, to construct two (2) new supercritical pulverized coal fired boilers, each rated at a maximum heat input rate of 5,700 million British thermal units per hour (BTU/hr), and other supporting equipment to be located at the proposed Pee Dee Generating Station site near Kingsburg, and having an address of 2651 South Old River Road, Pamplico, South Carolina. The two boilers will also be capable of firing up to 30% petroleum coke, commonly called petcoke (as a percent of the total solid fuel weight by weight) as fuel, and burning either ultra low sulfur fuel oil (No. 2 fuel oil allowed if ultra low sulfur fuel oil is not commercially available) or natural gas during periods of startup and flame stabilization. The application indicated these boilers will be equipped with Low Nitrogen Oxides (NO_x) Burners, two-level separated overfire air and Selective Catalytic Reduction (SCR) Controls for controlling NO_x emissions. Further, the application indicated the boilers will also be equipped with Flue Gas Desulfurization (wet limestone scrubbing) for controlling Sulfur Dioxide (SO_2) and sulfuric acid (H_2SO_4) emissions, and Electrostatic Precipitators for controlling Particulate Matter (PM) emissions.[1] Other equipment included in this project consists of a coal handling system (railcar shaker unloader, conveyors, storage pile, crusher tower, transfer tower, coal bunkers (six silos and one central dust collector in each of the two sets), an ash handling system including two fly ash silos, two emergency generators, a fire pump, several storage tanks (fuel oil, lube oil, ammonia, and other chemicals), a limestone handling system (material transport, truck unloading, storage pile, conveyors, crusher, and silos), and a gypsum handling system (dewatering, conveyors to drops, storage piles, and truck loading).

This project was determined to be subject to SC Regulation 61-62.5, Standard No. 7 "Prevention of Significant Deterioration (PSD)," based on potential emissions from the requested processes exceeding the 100 tons per year (TPY) major source status for a listed PSD category (fossil fuel boilers totaling more than 250 million BTU/hr heat input) for several pollutants. After completing PSD review, the Department placed a draft permit on public notice and a public hearing was held for the purpose of receiving comments on the Preliminary PSD Determination and draft PSD permit. The draft permit included requirements for the proposed facility to comply with the Clean Air Mercury Rule (CAMR),[2] which was promulgated in 2005 by the Environmental Protection Agency (EPA) as the required approach for controlling hazardous air pollutants (HAPs)[3] from electric utility steam generating units. The draft PSD permit also proposed a much lower pound per year mercury emission limit than CAMR required.

Following completion of the public comment period for the draft PSD permit that ended January 22, 2008, the United States Court of Appeals for the District of Columbia vacated the CAMR regulation.[4] The CAMR regulation, issued through Section 111[5] of the Clean Air Act (the Act),

[1] Particulate matter (PM) emissions include PM_{10} and $PM_{2.5}$.
[2] 40 CFR 60, Subpart HHHH and 24A S.C. Code Ann. Regs. § 61-62.60, Subpart HHHH (Supp. 2007).
[3] EPA has established a list of HAPs as found in Section 112(b) of the Clean Air Act.
[4] *New Jersey, et al. v. Environmental Protection Agency*, 517 F.3d 574 (D.C. Cir. 2008).
[5] Clean Air Act § 111, 42 U.S.C.A. § 7411 (1990).

contained methodology for regulating HAP emissions and was based on a determination made by the EPA that regulation of these HAPs was not necessary through Section 112[6] of the Act. In the absence of the CAMR regulation, the Department now believes that the Pee Dee Generating Station project must undergo review of HAPs based on Section 112 criteria.

Section 112 of the Act requires emission limits be established for source categories emitting HAPs in the form of maximum achievable control technology (MACT) standards. A time line was established for EPA in Section 112(e) of the Act to promulgate those standards and certain requirements were specified in Section 112(g) and 112(j) if no standard is in place or if those time lines were not met. Section 112(g) applies to new sources such as the proposed Pee Dee Generating Station and requires a Case-by-Case MACT Determination[7] when a MACT standard has not yet been promulgated under Section 112(d) of the Act. Due to the CAMR regulation vacatur and the absence of a MACT regulation[8] for the electric utility source category, Santee Cooper has submitted an application to obtain a 112(g) Determination for HAP emissions from the proposed Pee Dee Generating Station boilers.

The Clean Air Act requires a two-phase approach for setting standards for HAPs. The first phase includes the development of technology-based MACT standards. These standards are developed under the authorities of Section 112(d), 112(g), and 112(j) of the Clean Air Act. MACT standards are based on the performance of technology, and not on the health and environmental effects of hazardous air pollutants.[9] Section 112(f) of the Clear Air Act requires the EPA to set health-based standards eight years after a MACT standard is developed for each regulated source category to address any residual (or remaining) risk after MACT has been applied to provide an "ample margin of safety to public health."[10] Therefore, this Notice of MACT Approval (NOMA) only addresses the available control technologies to reducing HAP emissions and does not address the health and environmental effects the HAP emissions may impose.

In conjunction with the application for a 112(g) Determination, Santee Cooper has revised the specified control equipment for capturing PM emissions. The PSD draft permit was based on use of an electrostatic precipitator with each boiler; however, Santee Cooper now proposes to use a fabric filter baghouse that is expected to provide a level of control of PM equal to the electrostatic precipitator. Use of a fabric filter baghouse is expected to result in better control of mercury and other HAP metal emissions than would be achieved by using an electrostatic precipitator.[11]

The 112(g) Determination requires setting MACT standards described as:

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[6] Clean Air Act § 112, 42 U.S.C.A. § 7412 (1990).
[7] For purposes of this review, this Case-by-Case MACT Determination will be referred to interchangeably with the terms 112(g) Determination or MACT Determination.
[8] EPA initially drafted a proposed Utility MACT as required by Section 112 of the Act. Prior to final issuance of that regulation, EPA concluded utility HAPs could be regulated based on Section 111 of the Act which led to promulgation of the CAMR regulation. Upon vacatur of the CAMR regulation by the US Circuit Court of Appeals for the District of Columbia, requirements for regulating utility HAPs are presumed to revert to Section 112.
[9] *Sierra Club v. EPA*, 353 F.3d 976, 982 (D.C. Cir. 2004).
[10] 42 U.S.C.A. § 7412.
[11] *Santee Cooper Case-by-Case MACT Permit Application Proposed Pee Dee Coal-Fired Facility*, June 30, 2008, 2.

"Maximum achievable control technology (MACT) emission limitation for new sources" means the emission limitation which is not less stringent than the emission limitation achieved in practice by the best controlled similar source, and which reflects the maximum degree of reduction in emissions that the Department, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable by the constructed or reconstructed major source.[12]

"Similar source" means a stationary source or process that has comparable emissions and is structurally similar in design and capacity to a constructed or reconstructed major source such that the source could be controlled using the same control technology.[13]

Emissions

The application for a 112(g) Determination submitted by Santee Cooper on June 30, 2008, lists the HAPs that would result from combustion of coal at the proposed Pee Dee Generating Station. Two of those HAPs (hydrogen fluoride and hydrogen chloride) would be emitted above the 10 tons per year (TPY) major source threshold level and all combined HAPs would be emitted above the combined threshold level of 25 TPY, making this facility a major source based on HAP emissions.[14] Table 1 shows estimated HAP emissions by individual pollutant. Emission levels are based on factors taken from the EPA AP-42 tables.[15] These emission rates are based on burning only coal and do not include the effect of petcoke blended with coal. Combustion of a coal/petcoke blend should result in lower HAP emissions than burning coal alone since petcoke generally contain lower HAP content and has higher heat content.

[12] 40 CFR 63, Subpart B and 24A S.C. Code Ann. Regs. § 61-62.63.41(l) (Supp 2007).
[13] 40 CFR 63, Subpart B and 24A S.C. Code Ann. Regs. § 61-62.63.41(r) (Supp 2007).
[14] As stated in Section 112(a)(1) of the Act, a major source is defined as (i) For pollutants other than radionuclides, any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit, in the aggregate, 10 tons per year (TPY) or more of any HAP which has been listed pursuant to Section 112(b) of the Act, 25 TPY or more of any combination of such HAPs, or such lesser quantity as the Administrator may establish by rule. Notwithstanding the preceding sentence, emissions from any oil or gas exploration or production well (with its associated equipment) and emissions from any pipeline compressor or pump station shall not be aggregated with emissions from other similar units, whether or not such units are in a contiguous area or under common control, to determine whether such units or stations are major sources; or (ii) For radionuclides, "major source" shall have the meaning specified by the Administrator by rule.
[15] Emissions for pulverized coal fired boilers can be found at http://www.epa.gov/ttn/chief/ap42/ch01/index.html.

TABLE 1[16] SANTEE COOPER'S ESTIMATED HAP EMISSION RATES FOR PROPOSED PEE DEE GENERATING STATION BOILERS				
Pollutant	**Emission Factor***	**Lb/hr (each)**	**TPY (one unit)**	**TPY (two units)**
1,1,[2]-Trichloroethane	2.00E-05	5.18E-03	2.27E-02	4.54E-02
2,4-Dinitrotoluene	2.80E-07	7.25E-05	3.18E-04	6.35E-04
2-Chloroacetophenone	7.00E-06	1.81E-03	7.95E-03	1.59E-02
5-Methyl chrysene	2.20E-08	5.70E-06	2.50E-05	4.99E-05
Acenaphthene	5.10E-07	1.32E-04	5.79E-04	1.16E-03
Acenaphthylene	2.50E-07	6.48E-05	2.84E-04	5.67E-04
Acetaldehyde	5.70E-04	1.48E-01	6.47E-01	1.29E+00
Acetophenone	1.50E-05	3.89E-03	1.70E-02	3.40E-02
Acrolein	2.90E-04	7.51E-02	3.29E-01	6.58E-01
Anthracene	2.10E-07	5.44E-05	2.38E-04	4.77E-04
Benzene	1.30E-03	3.37E-01	1.48E+00	2.95E+00
Benzo(a)anthracene	8.00E-08	2.07E-05	9.08E-05	1.82E-04
Benzo(a)pyrene	3.80E-08	9.85E-06	4.31E-05	8.62E-05
Benzo(b,j,k)fluoranthene	1.10E-07	2.85E-05	1.25E-04	2.50E-04
Benzo(g,h,i)perylene	2.70E-08	7.00E-06	3.06E-05	6.13E-05
Benzyl chloride	7.00E-04	1.81E-01	7.94E-01	1.59E+00
Biphenyl	1.70E-06	4.40E-04	1.93E-03	3.86E-03
Bis(2-ethylhexyl)phthalate	7.30E-05	1.89E-02	8.28E-02	1.66E-01
Bromoform	3.90E-05	1.01E-02	4.43E-02	8.85E-02
Carbon disulfide	1.30E-04	3.37E-02	1.48E-01	2.95E-01
Chlorobenzene	2.20E-05	5.70E-03	2.50E-02	4.99E-02
Chloroform	5.90E-05	1.53E-02	6.70E-02	1.34E-01
Chrysene	1.00E-07	2.59E-05	1.13E-04	2.27E-04
Cumene	5.30E-06	1.37E-03	6.01E-03	1.20E-02
Cyanide [Compounds]	2.50E-03	6.48E-01	2.84E+00	5.67E-00
Dimethyl sulfate	4.80E-05	1.24E-02	5.45E-02	1.09E-01
Ethyl benzene	9.40E-05	2.44E-02	1.07E-01	2.13E-01
Ethyl chloride	4.20E-05	1.09E-02	4.77E-02	9.53E-02
Ethylene dibromide	1.20E-06	3.11E-04	1.36E-03	2.72E-03
Ethylene dichloride	4.00E-05	1.04E-02	4.54E-02	9.08E-02
Fluoranthene	7.10E-07	1.84E-04	8.06E-04	1.61E-03
Fluorene	9.10E-07	2.36E-04	1.03E-03	2.07E-03

[16] Emissions listed in this table were taken from the Santee Cooper 112(g) application. Methyl ethyl ketone (included by Santee Cooper) has been delisted as a HAP by EPA and has not been listed here; it is also excluded from the total as stated below.

TABLE 1[16] SANTEE COOPER'S ESTIMATED HAP EMISSION RATES FOR PROPOSED PEE DEE GENERATING STATION BOILERS				
Pollutant	**Emission Factor***	**Lb/hr (each)**	**TPY (one unit)**	**TPY (two units)**
Formaldehyde	2.40E-04	6.22E-02	2.72E-01	5.45E-01
Hexane	6.70E-05	1.74E-02	4.60E-02	1.52E-01
Hydrochloric acid**	6.00E-02	1.55E+01	6.81E+01	1.36E+02
Hydrogen fluoride**	7.50E-03	1.94E+00	8.51E+00	1.70E+01
Indeno(1,2,3-cd)pyrene	6.10E-08	1.58E-05	6.92E-05	1.38E-04
Isophorone	5.80E-04	1.50E-01	6.58E-01	1.32E+00
Methyl bromide	1.60E-04	4.15E-02	1.82E-01	3.63E-01
Methyl chloride	5.30E-04	1.37E-01	6.01E-01	1.20E0
Methyl hydrazine	1.70E-04	4.40E-02	1.93E-01	3.86E-01
Methyl methacrylate	2.00E-05	5.18E-03	2.27E-02	4.54E-02
Methyl terp butyl ether	3.05E-05	9.07E-03	3.97E-02	7.94E-02
Methylene chloride	2.90E-04	7.51E-02	3.29E-01	6.58E-01
Naphthalene	1.30E-05	3.37E-03	1.48E-02	2.95E-02
PCDD/PCDF (total)	1.76E-09	4.56E-07	2.00E-06	3.99E-06
Phenanthrene	2.70E-06	7.00E-04	3.06E-03	6.13E-03
Phenol	1.60E-05	4.15E-03	1.82E-02	3.63E-02
Propionaldehyde	3.80E-04	9.85E-02	4.31E-01	8.62E-01
Pyrene	3.30E-07	8.55E-05	3.74E-04	7.49E-04
Styrene	2.50E-05	6.48E-03	2.84E-02	5.67E-02
Tetrachloroethylene	4.30E-05	1.11E-02	4.88E-02	9.76E-02
Toluene	2.40E-04	6.22E-02	2.72E-01	5.45E-01
Vinyl acetate	7.60E-06	1.97E-03	8.62E-03	1.72E-02
Xylenes	3.70E-05	9.59E-03	4.20E-02	8.40E-02
Antimony [Compounds]	1.80E-05	4.66E-03	2.04E-02	4.09E-02
Arsenic [Compounds]	4.10E-04	1.06E-01	4.65E-01	9.31E-01
Beryllium [Compounds]	2.10E-05	5.44E-03	2.38E-02	4.77E-02
Cadmium [Compounds]	5.10E-05	1.32E-02	5.79E-02	1.16E-01
Chromium [Compounds]	3.39E-04	8.78E-02	3.85E-01	7.69E-01
Cobalt [Compounds]	1.00E-04	2.59E-02	1.16E-01	2.27E-01
Manganese [Compounds]	4.90E-04	1.27E-01	5.56E-01	1.11E+00
Mercury [Compounds]	10.4 ****	6.60E-03	2.89E-02	5.78E-02
Nickel [Compounds]	2.80E-04	7.25E-02	3.18E-01	6.35E-01
Selenium [Compounds]	1.30E-03	3.37E-01	1.48E+00	2.95E+00
Total HAPs***		20.67	90.53	181.06

*Emission factors taken from AP-42, Section 1.1, Bituminous and Subbituminous Coal Combustion, September 1998.

**Emission factors for all HAPs are controlled except for HCl and HF. A 95% control efficiency is assumed for the HCl and HF emissions factors, as these compounds are readily controlled by scrubbing systems.
***Total HAPs are conservatively assumed to include all lead emissions.
****Emission factor is in pounds per terawatt-hour gross, as proposed in the Santee Cooper Pee Dee 112(g) application.

112(g) Determination Approach

This 112(g) Determination will establish MACT emission limits for the proposed Pee Dee Generating Station boilers. Emission limits applicable to new sources will be the basis for this 112(g) Determination since this is a Greenfield site.[17] This analysis evaluates only those HAP emissions resulting from operation of the two boilers at the proposed Pee Dee Generating Station location since HAP emissions from all other proposed sources are expected to be negligible.

MACT Requirements

"MACT emission limitation for new sources" means the emission limitation which is not less stringent than the emission limitation achieved in practice by the best controlled similar source, and which reflects the maximum degree of reduction in emissions that the Department, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable by the constructed or reconstructed major source.[18]

In determining the emission limits, the Department must take into account all HAPs emitted from the boilers. The emission limits cannot be less stringent than the best controlled similar source, but must also consider further limitations to the extent the new source may be capable of achieving that reduction, considering cost, non-air quality health and environmental impacts, and energy requirements.

Similar Sources

Santee Cooper proposed in its application that the 112(g) Determination for the proposed Pee Dee Generating Station be established based on emission levels achieved from similar sources consisting of pulverized coal fired boilers burning bituminous coal. A "similar source" is defined in SC Regulation 61-62.63.41(r) as a stationary source or process that has comparable emissions and is structurally similar in design and capacity to a constructed or reconstructed major source such that the source could be controlled using the same control technology.

Santee Cooper has proposed to install supercritical pulverized coal boilers at the Pee Dee Generating Station location as described in the proposed PSD permit. Other facilities that use pulverized coal boilers are considered to be similar sources, whether they are supercritical by design or not, since all pulverized coal boilers can use the same control technology resulting in

[17] 40 CFR 63 Subpart B states Greenfield site means a contiguous area under common control that is an undeveloped site.
[18] 24A S.C. Code Ann. Regs. § 61-62.63.41(l) (Supp. 2007).

similar emission rates.

Santee Cooper proposed to exclude circulating fluidized bed (CFB) boilers as being dissimilar sources. CFB units have a unique firing design and employ a different process for combusting coal than pulverized coal units. CFB technology uses limestone injection into the burning zone which mixes with coal to reduce SO_2 emissions. The CFB technology also uses a fluidized bed to suspend the coal fragments for combustion at a lower temperature than pulverized coal boilers. Many CFB units burn a wide variety of fuels including waste coal while pulverized coal units typically do not. The coal injected into a CFB boiler is larger in size than the coal used in pulverized coal boilers. The combination of all those factors result in differences in control technology and lower controlled emission rates for at least some of the HAPs for CFB units. In EPA's review of available 1999 boiler information in developing the 2004 Utility MACT proposed rule,[19] the EPA determined that the emissions of CFB units had similar emissions as pulverized coal units, but considered these units to be a distinct type of boiler.

While the EPA 2004 proposed Utility MACT did not separate pulverized coal from CFB in proposing a mercury emissions limit for units burning bituminous coal, there were documents[20] contained in that study that expressed concerns and suggested that those processes have separate MACT emission limits. The Clean Energy Group stated in their comments dated September 6, 2002, that pulverized coal units and CFB units should be in separate categories. A group composed of the Clean Air Task Force, Environmental Defense, National Environmental Trust, National Wildlife Federation, and Natural Resources Defense Council also submitted comments (revised September 20, 2002) to EPA during the drafting of the proposed Utility MACT suggesting that CFB units be in a separate category with a lower mercury limit than for pulverized coal units. The Institute of Clean Air Companies on August 27, 2002 submitted comments to EPA supporting CFB units as a separate category. An "Industry Stakeholder Group" also submitted comments to EPA on September 6, 2002, with the recommendation to separate pulverized coal and CFB into separate categories. In addition to these above listed specific groups, other documentation in the proposed Utility MACT files contain further suggestions to separate pulverized coal units from CFB units for setting MACT standards. Based on these suggestions EPA decided to propose emission limits based on coal rank. The EPA proposed a separate mercury emission limit for units burning waste coal (or coal refuse). CFB units are typically used to burn waste coal.

The Department reviewed recent permitting decisions for CFB boilers in other states that resulted in very low mercury emission limits. A permit in Virginia for Virginia Electric and Power Company (Dominion) specified a mercury limit of 8.8 E-07 pounds per Megawatt hour (lb/MWh) which would equate to mercury emissions of about 4.5 pounds per year (lb/yr) for a unit the size of one of the proposed Pee Dee Generating Station boilers. This unit was permitted to burn many different fuels including waste coal. The limit for the Virginia permit was based on, but higher than, a CFB unit in Pennsylvania for Reliant Energy Seward burning similar fuels

[19] Proposed National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units; Proposed Rule, 69 Fed. Reg. 28606 (proposed January 30, 2004) (to be codified at 40 C.F.R. pts. 60, 63).
[20] *Clean Air Mercury Rule Docket*, www.epa/gov/ttn/atw.

and achieving a source test result of 0.03 pounds per trillion BTU (lb/TBTU) which would equate to emissions of about 1.5 lb/yr of mercury for a unit the size of one of the proposed Pee Dee Generating Station boilers. There are no known mercury controls or emission levels associated with pulverized coal boilers achieving rates as low as those CFB units. Based on the described design and process differences and absence of demonstrated mercury emission rates equivalent to the described CFB units, the Department agrees that comparison of similar sources should be limited to pulverized coal boilers and should exclude CFB boilers since CFB boilers are not similar in design to pulverized coal boilers.

Another type of power generating process that uses coal is integrated gasification combined cycle (IGCC) technology. In its review leading to the 2004 proposed Utility MACT, EPA concluded that IGCC is a separate source category and proposed a separate mercury emission limit. IGCC units combust a synthetic coal gas. No coal is directly combusted in the units in operation. The Department agrees with EPA's conclusion that IGCC units are a distinct class of boilers and has not considered HAP emissions rates from IGCC facilities as part of the MACT determination for the proposed Pee Dee Generating Station project.

Available information[21]

Sources to be considered in the analysis of the best controlled similar sources are specified in SC Regulation 61-62.63.43(d)(4) to include a proposed MACT standard or a presumptive MACT determination. Establishing a MACT emission limit requires identifying the best controlled similar source. Identification of such sources requires consideration of any proposed MACT determination that has not been finalized, and may include relevant information such as other similar 112(g) Determinations and known demonstrated emission rates. EPA proposed a Utility MACT in 2004, but that proposed rule was never finalized due to EPA's decision to pursue the CAMR rulemaking instead. Santee Cooper's application and this analysis do take into account the 2004 proposed Utility MACT to arrive at the proposed MACT emission limits. There was no presumptive MACT determination done for this category.

Achieved in Practice

Proposed MACT emission limits must be based on rates achieved in practice by the best controlled similar source. Emission limits are established differently for new sources than for existing sources. MACT determinations for existing sources must be no less stringent than the average of the top 12% in the category.[22] MACT determinations for new sources must be based on the best performing source in that category. For both existing and new sources, the basis for the MACT emission limits are emission rates that are achieved in practice. The Santee Cooper application references emission rates that are described in the PSD application and draft PSD permit. Some of those rates may be proposed, as is the case for Pee Dee Generating Station limits, or permitted but not operational, as compared to operating units having confirmed emission rates that meet the specified limits. In order for proposed PSD emission limits to be proposed as MACT emission limits, the Department must show that those limits are achieved.

[21] 24A S.C. Code Ann. Regs. § 61-62.63.41(d) (Supp 2007).
[22] 24A S.C. Code Ann. Regs. § 61-62.63.51 (Supp 2007).

Part of the development of the EPA 2004 proposed Utility MACT was a collection of substantial amounts of coal analyses and source test information regarding mercury emissions. The analysis developed by EPA (and also supported in many other decisions) recognized that the use of stack test data alone was not sufficient for establishing a MACT emission limit. Because of many variables, the emission level achieved on a single or even several stack tests may not be possible with continual operations. Emission variability will occur over time because of changes in fuel characteristics as well as operational changes over the life span of the unit. Thus, the EPA reflected variability in the proposed MACT limits by acknowledging fuel variations and, to some extent, process variations as well. For some process scenarios, the EPA relied on correlations developed to allow for that type of variability. The EPA linked mercury content in coal samples with mercury emissions and then established a limit for which emissions from 97.5% of coal received would not be expected to exceed that level.[23]

The best performing source determined in the EPA 2004 proposed Utility MACT was Stockton, a circulating fluidized bed (CFB) combustion unit in California.[24] Since that unit is a CFB boiler, the application submitted by Santee Cooper eliminated that source from consideration based on a separate suggested categorization for that type source. In the review of pulverized coal units to determine best controlled similar source from those listed in the EPA 2004 proposed Utility MACT, Santee Cooper proposed in their application additional variability considerations beyond those developed by the EPA. For those sources in which the EPA relied on stack test data to establish a removal rate, Santee Cooper proposed a removal rate based on a 97.5% confidence level applied to the stack test data. Further, as a separate approach, Santee Cooper proposed to base fuel variability on all coal in the category rather than facility-specific coal as the EPA did in its 2004 proposed Utility MACT.

In addition to considering the EPA's 2004 proposed Utility MACT for establishing MACT emission limits for the Pee Dee Generating Station boilers, the Department has also reviewed other recent 112(g) applications and applicable source tests results to determine emissions achieved in practice. Supplemental information requested from Santee Cooper also addressed these type emissions.

Some 112(g) MACT determinations for electric utilities have been issued in other states. In addition to the application from Santee Cooper for the Pee Dee Generating Station, several other 112(g) MACT applications for electric utilities have been submitted in other states. Santee

[23] The use of a confidence level of 97.5% is a typical practice in establishing a limit that will accommodate expected variations around an average, with exceedance of that level rarely if ever being encountered. For a limit that is expressed only as an upper boundary, the 2.5% of samples that exceed the confidence level are all at the upper end of the distribution. The use of a 97.5% confidence level was used in the EPA 2004 proposed Utility MACT.

[24] The EPA 2004 proposed Utility MACT specified coal fired unit emission limits for mercury only based on the following categories: Bituminous/anthracite – 2.0 lb/TBTU or 21E-06 lb/MWh (existing sources), 6.0E-06 lb/MWh (new sources); Subbituminous – 5.8 lb/TBTU or 61E-06 lb/MWh (existing sources), 20E-06 lb/MWh (new sources); Lignite – 9.2 lb/TBTU or 98E-06 lb/MWh (existing sources), 62E-06 lb/MWh (new sources); IGCC – 19 lb/TBTU or 200E-06 lb/MWh (existing sources), 20E-06 lb/MWh (new sources): Coal refuse – 0.38 lb/TBTU or 4.1E-06 lb/MWh (existing sources), 1.1E-06 lb/MWh (new sources). All limits are based on 12-month rolling averages.

Cooper identified 39 other facilities[25] containing mercury emission limits or requirements, most of which contained 112(g) MACT requirements. In addition to those listed by Santee Cooper, the Department identified 9 other 112(g) MACT applications[26] that were also considered in this review. Mercury emission limits stated in those determinations and applications that are lower than the limit proposed for the Santee Cooper Pee Dee Generating Station are based on either 1) use of different type fuel (e.g., subbituminous coal), 2) operation of dissimilar source (e.g., CFB unit), 3) state-specific mercury rule not directly comparable, or 4) use of mercury limit for bituminous coal from the EPA 2004 proposed Utility MACT that was set based on a CFB unit as best controlled source.

The Department also reviewed emissions data from mercury source tests and mercury CEMS reports. Source test results requested from other states showed some individual results that are lower than the limit proposed for the Santee Cooper Pee Dee Generating Station. However, use of those results to establish 112(g) MACT limits must incorporate adequate variability such that a source can meet the emission limitation under the worst foreseeable circumstances.[27] Mercury CEMS reports submitted by Santee Cooper for the Cross Generating Station Units 1 and 2 have also been reviewed. The Cross Units 1 and 2 mercury CEMS have only been operating a few years. CEMS data can be more representative of continuing operation than a single source test; however, that data, if only for a limited period, may not show effects from varying fuel use or equipment performance over long-term operation. Similar to the manner in which source test results are considered, the CEMS data must consider some level of variability though not necessarily to the extent as with source tests. In addition, there is some concern with the degree of accuracy with the mercury CEMS data for the Cross Generating Station units, in which the two CEMS units show distinctly different results even though the two boilers are equivalent in design, combust the same coal, and have equivalent controls.

Surrogate Limits

Santee Cooper proposed to categorize the HAPs into four categories and to establish surrogate limits for three of the four categories. The four categories are mercury, non-mercury metal HAPs, acid gas HAPs, and organic HAPs. The EPA has consistently used the surrogate approach in establishing emission limits and compliance requirements.[28] [29] This same type of categorization has been proposed and used in similar reviews in some other states. This categorization was also used previously in permitting two boilers for the Santee Cooper Cross Generating Station and is still considered by the Department to be a valid categorization based

[25] Santee Cooper response to additional information request from the Department, August 13, 2008.
[26] Cliffside Steam Station; Limestone Electric Generating Station; John W. Turk, Jr. Plant; Mid –Michigan Energy, LLC; Wolverine Power Supply Cooperative; Consumers Energy Company; Green Energy Partners, LLC.; Interstate Power and Light; Elk Run Energy Associates, LLC.
[27] *Sierra Club v. EPA*, 167 F.3d 658 (D.C. Cir. 1999).
[28] National Emission Standards for Hazardous Air Pollutants for the Pulp and Paper Industry, (April 15, 1998) 63 Fed. Reg. 18504; National Emission Standards for Hazardous Air Pollutants: Final Standards for Hazardous Air Pollutants for Hazardous Waste Combustors (Phase I Final Replacement Standards and Phase II), 64 Fed. Reg. 52828 (September 30, 1999).
[29] The application submitted by Santee Cooper cited several cases in support of using surrogate pollutants (*Sierra Club v. EPA*, 353 F.3d 976, 982 (D.C. Cir. 2004) and 3 others). In addition, the Department's review of other case-by-case MACT applications included use of surrogate pollutants.

on how each category is controlled. Such categorization can provide a reasonable approach for establishing limits and monitoring for demonstrating compliance. For any categories in which the pollutants are emitted in significant quantities or where concern exists that the surrogate pollutant may not provide sufficient demonstration of compliance, supplemental limits and testing can also be established. Each of these categories will be discussed in the following sections of this review.

112(g) Determination

Establishment of the Floor

SC Regulation 61-62.63 defines the "Maximum Achievable Control Technology (MACT) floor" to mean: (1) For existing sources: (i) The average emission limitation achieved by the best performing 12 percent of the existing sources in the United States (for which the Administrator has emissions information), excluding those sources that have, within 18 months before the emission standard is proposed or within 30 months before such standard is promulgated, whichever is later, first achieved a level of emission rate or emission reduction which complies, or would comply if the source is not subject to such standard, with the lowest achievable emission rate (as defined in section 171 of the Act) applicable to the source category and prevailing at the time, in the category or subcategory, for categories and subcategories of stationary sources with 30 or more sources; or (ii) The average emission limitation achieved by the best performing five sources (for which the Administrator has or could reasonably obtain emissions information) in the category or subcategory, for categories or subcategories with fewer than 30 sources; (2) For new sources, the emission limitation achieved in practice by the best controlled similar source.

The term "beyond the floor" thus signifies an emission limit more stringent than the limit established as the floor that can be achieved through further application of technology or other capability, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements.

MACT Determination for Mercury Emissions

Mercury Floor

Santee Cooper submitted two statistical methodologies for establishing the MACT floor, Prong 1 and Prong 2. Using Prong 1, Santee Cooper recommended a MACT floor mercury emissions limit of 10E-06 lb/MWh (approximately 57 lb/yr). Using Prong 2, the MACT floor mercury emissions limit would be 8.0E-06 lb/MWh (approximately 46.3 lb/yr). The information below describes each method.

Prong 1[30]

In addition to the top three performing pulverized coal sources listed in the EPA 2004 proposed Utility MACT, Santee Cooper also included five additional pulverized coal units from the EPA's 1999 Information Collection Request (ICR) III database[31] used for the EPA 2004 proposed Utility MACT in its evaluation.

In the first step, Santee Cooper calculated the uncontrolled emission level by dividing the average controlled emission levels by the average removal efficiency. The average removal efficiency and controlled emission level were taken from the results of three-run stack tests. In the second step, an adjusted controlled emission level was determined applying a 97.5% confidence interval to the stack test controlled emissions. In the third step, a final removal efficiency was determined using the adjusted controlled emission level and the calculated uncontrolled emission rate. The fourth step then involved an equation[32] using the final removal efficiency and mercury content from each coal analysis sample for each facility to determine the range of emission rates for all sampled levels of mercury content in coal in EPA's ICR II database. In the fifth step each of the eight facilities emission levels was determined by ranking the range of emission rates to select the 97.5 percentile highest emission level. In the final step of using the Prong 1 approach, the Clover facility in Virginia was determined to have the lowest mercury emission rate after accounting for fuel and process variability.

The Prong I approach also used the "z-statistic" to account for process variability. Santee Cooper used only three samples (observations) when the z-statistic was applied. The z-statistic is typically used for larger numbers of samples. Prong 1 was used by the National Association of Clean Air Agencies (NACAA) in developing the *Reducing Hazardous Air Pollutants from Industrial Boilers: Model Permit Guidance* (June 2008).

For units where the chlorine content in coal could be correlated with mercury removal, that correlation was used in place of stack test data. The correlation equation was used in the EPA 2004 proposed Utility MACT.

Prong 2[33]

The first step established the 97.5 percentile highest mercury content in coal from all facilities in the EPA's ICR II database. In the second step, this coal rank was applied to each facility's mercury emission removal rate, taken from the results of three-run stack tests, to calculate the emission limit for each facility.

[30] Santee Cooper's response to additional information request from the Department. "Santee Cooper Flowchart, Case by Case Mercury Variability Approach- EPA-NACAA", September 09, 2008.
[31] EPA used two databases, generally cited at: "ICR-2" (analysis of over 40,000 coal deliveries to power plants in 1999) and "ICR-3" (stack tests of 81 coal fired plants, also in 1999).
[32] *Santee Cooper Case-by-Case MACT Permit Application Proposed Pee Dee Coal-Fired Facility*, June 30, 2008, Appendix D.
[33] Santee Cooper's response to additional information request from the Department. "Santee Cooper Flowchart, Case-by-Case Mercury Variability Approach- EPA-NACAA", September 09, 2008.

For units where the chlorine content in coal could be correlated with mercury removal, that correlation was used in place of stack test data. The correlation equation was used in the EPA 2004 proposed Utility MACT.

Using the Prong 2 approach, the Clover facility in Virginia was determined to have the lowest mercury emissions rate after accounting for fuel and process variability. The coal selection methodology in Prong 2 was developed by the Department of Energy.

The Department has determined that Prong 2 is a more appropriate methodology because it accounted for a broader range of coal samples, it did not rely on the z-statistic, and it provided a lower mercury emissions limit. Therefore, the Department has proposed a mercury emissions limit of 8.0E-06 lb/MWh and 46.3 lb/yr per unit.

This proposed emission limit is based on burning coal alone to reflect the requirement that the facility manage the process and meet the emission limit based on whatever coal properties are encountered. Further, the facility has also requested the capability to burn petcoke up to 30% by weight. Since petcoke usually contains undetectable levels of mercury, the MACT emission limit should be achievable.

Mercury Beyond-the-Floor

After determining the "MACT floor," the Department must consider possible "beyond the floor" control technologies and emissions limitations. Three factors must be considered in evaluating further reductions in emissions limitation from installing additional control technologies: 1) the cost of achieving further reductions, 2) any non-air quality health and environmental impacts of achieving further reductions, and 3) energy requirements of achieving further reductions. [34]

Santee Cooper provided information on two control technologies that were considered for possible further mercury emissions reductions beyond the floor – Sorbent Injection, and Electro Catalytic Oxidation.

Sorbent injection using activated carbon, commonly referred to as activated carbon injection (ACI), is a technology where activated carbon sorbent is injected into the flue gas stream at a location in the duct preceding the PM control device, which usually is an electrostatic participator (ESP) or a fabric filter. The sorbent binds with the mercury in the flue gas stream in the duct and in the PM control device. Subsequently, the mercury-containing sorbent is captured in the PM control device. Greater mercury removal is expected by using a fabric filter compared to an ESP because of enhanced gas-particle contact in the filter cakes on the surface of the bags in the fabric filter.[35] Santee Cooper has proposed to install a fabric filter instead of an ESP to obtain greater mercury emissions control.

ACI technology is being used at some pulverized coal units that combust subbituminous coals and low sulfur western bituminous coals. There is uncertainty as to the effectiveness of using

[34] *Sierra Club v EPA*, 353 F. 3d 976,980 (D.C. Cir. 2004).
[35] http://epa.gov/mercury/control_emissions/tech_merc_specific.htm.

ACI technology to further reduce mercury emissions when combusting typical eastern bituminous coals with higher sulfur content.[36] Santee Cooper has proposed to use eastern bituminous coal due to the transportation difficulties and significant cost of receiving low sulfur western coal at the proposed Pee Dee Generating Station site.[37]

Santee Cooper provided a cost analysis for ACI technology in Appendix E of its 112(g) application. Santee Cooper estimated the total annual cost of ACI technology to be greater than $10,000,000, resulting in a cost per pound of mercury emissions removed to be greater than $100,000. Although the 112(g) regulations do not establish a cost effectiveness threshold to determine when a control technology is cost prohibitive, the EPA has estimated the cost of ACI technology for other MACT standards that regulate mercury emissions. For the Hazardous Waste Combustor MACT,[38] the EPA estimated ACI technology incremental annualized compliance cost to be $11,500 per pound of mercury. The EPA determined, based on this cost, not to require ACI technology for new sources. In the Clean Air Mercury Rule (CAMR), the EPA proposed to use a safety valve price of $2,187 per ounce (approximately $35,000 per pound).[39] Based on the cost information provided to date, the Department has determined that the use of ACI technology is cost prohibitive at this time. However, the Department has proposed a condition that requires the boilers to be installed in a manner that should future mercury specific control be required, the installed equipment will accommodate the anticipated space necessary for the future mercury control technology.

When activated carbon is injected as a sorbent, the fly ash carbon content increases and prevents the fly ash from being used by other industries as a raw material. The Portland Cement MACT Standard[40] bans the use of fly ash that contains any mercury sorbent from being used as a raw material in any cement kiln. The EPA determined that this type of fly ash would increase emissions from cement kilns. The concrete industry does not typically use fly ash containing high levels of carbon.

There are no known adverse non-air health impacts of using ACI technology. It is uncertain as to whether ACI technology will further reduce mercury emissions when typical eastern bituminous coal is being burned. The non-air quality environmental impacts of using ACI technology include the need to landfill a significant amount of fly ash in nearby landfills. If Santee Cooper decides to install ACI technology and is not able to sell the sorbent-containing fly ash to other industries, the fly ash would need to be landfilled. Santee Cooper estimates that up to 200,000 tons of fly ash per year may be disposed of in nearby landfills if ACI technology is used. There are no direct energy impacts of using ACI technology.

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[36] *Impact of Sulfur Oxides on Mercury Capture by Activated Carbons*, Albert A. Presto (Carnegie Mellon) and Evan J. Granite (National Energy Technology Laboratory) (presentation delivered at DOE/NETL 2007 Mercury Control Conference, December 12, 2007).

[37] Santee Cooper Comments on Draft PSD Permit for Proposed Pee Dee Facility, January 22, 2008.

[38] National Emission Standards for Hazardous Air Pollutants: Proposed Standards for Hazardous Air Pollutants for Hazardous Waste Combustors (Phase I Final Replacement Standards and Phase II); Proposed Rule, 69 Fed. Reg. 21253 (April 20, 2004).

[39] Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units; Final Rule, 70 Fed. Reg. 28630 (May 18, 2005).

[40] National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry; Final Rule and Proposed Rule, 71 Fed. Reg. 76518 (December 20, 2006).

Based on the cost impacts and possible additional non-air quality environmental impacts of using ACI technology, the Department has determined that ACI technology is not justified as beyond the floor control technology.

Electro catalytic oxidation (ECO) is a technology that may be used to reduce SO_2 and NO_x emissions instead of a wet scrubber, low-NO_x burners, and a selective catalytic reduction (SCR) system. Based on the information provided and reviewed by the Department, the Department has determined that the co-benefits of using low-NO_x burners, a two-level separated overfire air system, a SCR system, a wet limestone flue gas desulfurization (FGD), and fabric filter to control mercury emissions is greater than using ECO technology. The Department was not able to locate any information that demonstrates ECO technology being used as an add-on control technology downstream from other SO_2 and NO_x control technologies. The Department has determined that ECO technology is not justified as beyond the floor control technology.

The Department has proposed a mercury MACT emissions limit of 8.0E-06 lb/MWh and 46.3 lb/yr per unit. Compliance will be demonstrated with the lb/MWh emission limit using a mercury CEMS on a 12-month rolling average. Compliance will be demonstrated with the lb/yr emission limit using a mercury CEMS on a 12-month rolling sum.

MACT Determination for Non-mercury Metal HAPs

Non-mercury Metal HAPs Floor

Santee Cooper proposed that the filterable portion of PM_{10} be considered as a surrogate for non-mercury metal HAPs. This correlation is made on the premise that controlling filterable PM_{10} emissions will also result in controlling non-mercury metal HAPs as well. Based on previous similar use of surrogate limits including agreement from EPA and court rulings,[41] the Department determined that the use of filterable PM_{10} is an appropriate surrogate for non-mercury metal HAP.

Determining the appropriate limit for filterable PM_{10} in this MACT determination involves finding the "achieved in practice emission level of the best controlled similar source." A review of emission limits specified for similar units in recent PSD determinations for similar sources showed 0.012 lb/million BTU as the floor.

The Department also reviewed stack test data from Cross Unit 3 at the Santee Cooper Cross Generating Station. A stack test conducted in January 2007, showed filterable PM_{10} emissions of 0.012 lb/million BTU. Another stack test conducted in January 2008 showed filterable PM_{10} emissions of 0.0099 lb/million BTU. Based on those results, and in order to allow for some level of variability, the Department does not believe those rates justify a limit lower than the proposed 0.012 lb/million BTU.

[41] The application submitted by Santee Cooper cited several cases in support of using surrogate pollutants (*Sierra Club v. EPA*, 353 F.3d 976, 982 (D.C. Cir. 2004) and 3 others). In addition, the Department's review of other case-by-case MACT applications included use of surrogate pollutants.

Non-mercury Metal HAPs Beyond-the-Floor

After determining the "MACT floor," the Department must consider possible "beyond the floor" control technologies and emissions limitations. Three factors must be considered in evaluating further reductions in emissions limitation from installing additional control technologies: 1) the cost of achieving further reductions, 2) any non-air quality health and environmental impacts of achieving further reductions, and 3) energy requirements of achieving further reductions.

Santee Cooper did not propose any beyond the floor control technologies in its 112(g) application. The Department determined that the fabric filter control would be representative of the maximum achievable control technology for filterable PM_{10}.

Compliance with the filterable PM_{10} MACT emission limit will be demonstrated by an initial and annual source test, as well as the installation, operation and maintenance of a bag leak detection system (BLDS).

MACT Determination for Acid Gas HAPs

Acid Gas HAPs Floor

Santee Cooper proposed that SO_2 be considered as a surrogate pollutant for acid gas HAPs. This correlation is made on the premise that controlling SO_2 emissions will also result in controlling acid gas HAPs; therefore the removal of SO_2 emissions through the wet Flue Gas Desulfurization (FGD) controls would also result in removal of hydrogen chloride and hydrogen fluoride emissions. In a calcium-based scrubber system, such as a wet FGD, SO_2 removal correlates well with the removal of acid gas HAPs.[42] Based on previous similar use of surrogate limits including agreement from EPA and court rulings, the Department determined that the use of SO_2 is an appropriate surrogate for acid gas HAPs.

Determining the appropriate limit for SO_2 in this MACT Determination involves finding the "achieved in practice emission level of the best controlled similar source." A review of emission limits specified for similar units in recent PSD determinations showed a level of 0.12 lb/million BTU as the floor.

Acid Gas HAPs Beyond-the-Floor

After determining the "MACT floor," the Department must consider possible "beyond the floor" control technologies and emissions limitations. Three factors must be considered in evaluating further reductions in emissions limitation from installing additional control technologies: 1) the cost of achieving further reductions, 2) any non-air quality health and environmental impacts of achieving further reductions, and 3) energy requirements of achieving further reductions.

Santee Cooper provided information on two control technologies that were considered for possible further emissions reductions beyond the floor – wet Electrostatic Precipitator (ESP) and

[42] *Recommendations For The Utility Air Toxics,* MACT Final Working Group Report, October 2002.

Spray Dryer Absorber (SDA).

A wet ESP is a technology similar to a dry ESP except a thin film of liquid flows over the collection plates or is sprayed in the gas flow passages. In the Santee Cooper MACT application, the use of a wet ESP was presented as a potential "beyond the floor" technology for reducing acid gases. Santee Cooper estimated the cost effectiveness value at approximately $165,000 per ton for the addition of a wet ESP to further reduce acid gas emissions 50% beyond the current controls of the FGD system. Based on the cost impacts, the Department has determined that wet ESP technology is not justified as beyond the floor control technology.

SDA is a technology that is used to reduce SO_2 using the same principles as the FGD, except that the flue gas is contacted with a fine mist of lime slurry instead of a bulk liquid. Information provided by Santee Cooper indicated the SDA would provide a control efficiency of 90%, compared to a wet FGD system with 98% control efficiency. Therefore the Department has determined the use of an SDA is not justified as beyond the floor control technology.

Compliance with the SO_2 limit will be demonstrated by CEMS data using a 30-day rolling average. In addition to the surrogate MACT emission limit for SO_2, the acid gas HAPs are emitted in quantities above the major source threshold. The Department determined testing for these pollutants are appropriate to confirm the proposed emission levels and provide a direct comparison of the surrogate and acid gas HAPs. Initial source testing for HCl and HF shall be conducted within 60 days of full operation of each boiler, but not more than 180 days from start of operation. In addition, an annual periodic compliance test will be required during which HCl and HF pollutant shall be measured as well as the surrogate to provide that correlation.

MACT Determination for Organic HAPs

Organic HAPs Floor

Santee Cooper has proposed that CO be considered as a surrogate pollutant for organic HAPs. This correlation is made on the premise that CO emissions will vary in the same manner as organic HAP emissions. Organic HAP emissions, as well as CO emissions, are a function of the coal combustion process, with good combustion practices minimizing the organic HAP and CO emissions all those emissions. Based on previous similar use of surrogate limits, including agreement from EPA[43] and court rulings, the Department determined that use of CO is an appropriate surrogate for organic HAPs.

Determining the appropriate limit for CO in this MACT Determination involves finding the "achieved in practice emission level of the best controlled similar source." The best controls in practice for organic HAP emissions from pulverized coal fired boilers are good combustion

[43] In the EPA Boiler MACT, EPA established that CO is considered a good indicator of incomplete combustion, and as such there is a direct correlation between CO emissions and the formation of organic HAP emissions. Monitoring equipment for CO is readily available, which is not the case for organic HAP. Also, it is significantly easier and less expensive to measure and monitor CO emissions than to measure and monitor emissions of each individual organic HAP.

practices. A review of emission limits specified for similar units in recent 112(g) applications, 112(g) permits and PSD determinations showed CO limits ranging from 0.10 lb/million BTU to 0.25 lb/million BTU. The CO emission limit for the Pee Dee Generating Station is proposed to be 0.15 lb/million BTU, utilizing a CO CEMS on a 30-day rolling average basis. The use of a CEMS for the Pee Dee Generating Station units is considered to be a more rigorous monitoring requirement than a 3-hr performance testing requirement. Most facilities with CO limits reflecting 0.10 lb/million BTU do not have the CEMS requirement. The Department has determined that the limit of 0.15 lb/million BTU for CO with the use of a CEMS is the MACT floor emission limit for organic HAP emissions.

Organic HAPs Beyond-the-Floor

After determining the "MACT floor," the Department must consider possible "beyond the floor" control technologies and emissions limitations. Three factors must be considered in evaluating further reductions in emissions limitation from installing additional control technologies: 1) the cost of achieving further reductions, 2) any non-air quality health and environmental impacts of achieving further reductions, and 3) energy requirements of achieving further reductions.

Santee Cooper provided information on one control technology that was considered for possible further organic HAP reductions. Oxidation catalysts controls are a demonstrated process for controlling organic HAP emissions from other combustion sources (e.g., gas turbines) but are not considered technically feasible for pulverized coal boilers. The oxidation catalysts systems could become contaminated by SO_2, sulfuric acid and fly ash laden gas. The catalyst could also contribute to an increased sulfur trioxide formation. In addition, based on information received from Santee Cooper, oxidation catalysts systems for pulverized coal fired units are not commercially available and there are no known installations of these units to treat the flue gas of any large coal fired electric generating unit. The Department has determined that oxidation catalysts systems technology is not justified as beyond the floor control technology.

The Department determined MACT to be an emission limit of 0.15 lb/million BTU CO. Compliance with the CO limit will be demonstrated by CEMS data using a 30-day rolling average.

Proposed MACT Limits and Requirements

The Department has made an initial decision to approve Santee Cooper's application for a MACT determination subject to the terms and conditions set forth in the Notice of MACT approval.

Paragraph (g) of SC Regulation 61-62.63.43 establishes that the Department will determine a MACT emission limitation or standard and include it along with any specific notification, operation, and maintenance performance testing, monitoring, reporting and record keeping requirements in a Notice of MACT Approval.

In conformity with the general principles of MACT determinations set forth in Paragraph (d) of SC Regulation 61-62.63.43, the Department's determination includes whether the MACT emission limitation or requirements recommended by the applicant and approved by the Department are not less stringent that the emission control which is achieved in practice by the best controlled similar source. The Department's determination is based upon available information on emission limitations and control technology, taking into consideration the associated costs of achieving such emission reduction and any non-air quality health and environmental impacts and energy requirements.

General Requirements

1. The owner/operator shall comply with 40 CFR 63, National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories, Subparts A (General Provisions) and B (Requirements for Control Technology Determinations for Major Sources in Accordance with Clean Air Act Sections, Sections 112(g) and 112(j)) and SC 61-62.63, Subparts A and B, as applicable.

2. All provisions contained in this Notice of MACT Approval (NOMA) shall be federally enforceable upon the effective date of issuance of such notice, as provided by SC Regulation 61-63.43(j). [SC Regulation 61-63.43(g)(3)]

3. This NOMA applies to two nominal 5,700 million Btu/hr (660 MW gross output) pulverized coal fired boilers to be located at the proposed site described as the Pee Dee Generating Station located at 2651 Old South River Road, Pamplico, SC.

4. The following controls shall be installed and operated on each of the two boilers.
   (a) Fabric Filters (FF) for control of PM_{10}, Mercury, and Non-mercury Metal HAPs.
   (b) Flue Gas Desulfurization (FGD) for control of SO_2, Mercury, and Acid Gas HAPs.
   (c) Low NO_x Burners (LNB), Separated Overfire Air (SOFA), and Selective Catalytic Reduction (SCR) for control of Mercury.

   During operation of these boilers, all control devices shall be operated consistent with the technological limitations, manufacturer's specifications, and good engineering and maintenance practices for the control devices.

5. These boilers are permitted to burn bituminous coal, or bituminous coal with petcoke blended up to 30% by composite weight (i.e., 30% petcoke and 70% coal) as fuel. Ultra low sulfur fuel oil (or fuel oil No. 2 containing 0.05% or less sulfur if ultra low sulfur fuel oil is not commercially available) and natural gas may be used for initial firing of each boiler during startup in addition to periods requiring flame stabilization. The use of any other substances as fuel is prohibited without prior written approval from the Department.

6. All official correspondence, plans, application forms, and written statements are an integral part of this NOMA.

7. The owner/operator shall submit written notification to the Director of the Engineering Services Division of the date construction is commenced, postmarked no later than 30 days

after such date, and written notification of the actual date of initial startup of each new or altered source, postmarked within 15 days after such date.

8. The owner or operator shall comply with all terms, conditions, and limitations of this NOMA.

Emission Limits

9. Pursuant to 40 CFR 63.43(g) and SC Regulation 61-63.43(g)(1), MACT determination, the permittee shall comply with the following emissions limitations for HAP emissions:

Table 2
EMISSION LIMITATIONS

Pollutant	Emission limit (Each Boiler)	Averaging Period
Filterable PM_{10} (as a surrogate for Non-Mercury Metal HAPs)	0.012 lb/million Btu	3-hour
SO_2 (as a surrogate for Acid Gases)	0.12 lb/million BTU	30-day
CO (as a surrogate for Organic HAPs)	0.15 lb/million Btu	30-day
Mercury	8.0E-06 lbs/MWh 46.3 lbs/yr	12 month rolling average 12 month rolling sum

General Compliance Requirements

10. The owner/operator must be in compliance with the emissions limitations in Table 2, including operating limits, at all times, except during periods of startup, shutdown, and malfunction.

11. The owner/operator must always operate and maintain each boiler, including air pollution control and monitoring equipment, according to the provisions in 40 CFR 63.6(e)(1)(i).

12. The owner/operator must develop a written startup, shutdown, and malfunction plan, as outlined in 40 CFR 63.6(e)(3)**,** that describes, in detail, procedures for operating and maintaining each boiler during periods of startup, shutdown, and malfunction; and a program of corrective action for malfunctioning process, air pollution control, and monitoring equipment used to comply with the emission limitations in Table 2. The startup, shutdown, and malfunction plan does not need to address any scenario that would not cause either boiler to exceed an emission limitation. This plan must be developed by the owner/operator by startup**.** During periods of startup, shutdown, and malfunction, the owner/operator must operate each boiler in accordance with the startup, shutdown, and malfunction plan.

13. Consistent with 63.6(e) and 63.7(e)(1), deviations that occur during a period of startup, shutdown, or malfunction are not violations if the owner/operator demonstrate to the Administrator's satisfaction that the owner/operator was operating in accordance with the startup, shutdown, and malfunction plan. The Administrator will determine whether

deviations that occur during a period of startup, shutdown, or malfunction are violations, according to the provisions in 40 CFR 63.6(e).

Initial Compliance Requirements

14. In order to demonstrate initial compliance with the emissions limitations in Table 2, the owner/operator must conduct performance tests, set operating limits, and conduct monitoring equipment performance evaluations within 60 days after achieving the maximum production rate at which the facility will be operated, but not later than 180 days after initial startup.

TABLE 3
INITIAL COMPLIANCE REQUIREMENTS

Pollutant	Emission Limit (Each Boiler)	Method
Filterable PM_{10} (as a surrogate for Non-Mercury Metal HAPs)	0.012 lb/million Btu	As Approved by the Bureau
SO_2 (as a surrogate for Acid Gases)	0.12 lb/million BTU	As Approved by the Bureau
CO (as a surrogate for Organic HAPs)	0.15 lb/million Btu	As Approved by the Bureau
Mercury (Hg)	8.0E-06 lbs/MWh 46.3 lbs/yr	As Approved by the Bureau
Hydrogen Chloride (HCl)	2.72E-03lb/million Btu	As Approved by the Bureau
Hydrogen Fluoride (HF)	3.40E-04lb/million Btu	As Approved by the Bureau

15. The owner/operator shall conduct each performance test listed in Table 3 in accordance with paragraphs (a) through (d).
    (a) The owner/operator must conduct each performance test according to 40 CFR 63 Section 63.7 and SC Regulation 61-62.1 Section IV – Source Tests.
    (b) The owner/operator may not conduct performance tests during periods of startup, shutdown, or malfunction.
    (c) The owner/operator must conduct each performance test at representative performance (i.e., performance based on normal operating conditions) and must demonstrate initial compliance based on this test.
    (d) Notification of intent to source test, submittal of site-specific test plans, performance of source tests, and the reporting of source test results shall comply with 40 CFR 63 Section 63.7, 63.10 and with South Carolina Regulation 61-62.1, Section IV, Source Tests. The owner/operator shall submit a site specific test plan at least 60 calendar days before the performance test is scheduled to take place**.** The Department must be notified at least two weeks prior to a source test so that a Department representative may be present.

Continuous Compliance Requirements

16. Pursuant to 40 CFR 63.43 (g)(2)(ii) and SC Regulation 61-63.43(g)(2), the owner/operator shall conduct the following monitoring to assure continuous compliance with the applicable emission limitations in Table 2:

TABLE 4
CONTINUOUS COMPLIANCE REQUIREMENTS

Pollutant	Monitoring (Each Boiler)
Filterable PM_{10} (as a surrogate for Non-Mercury Metal HAPS)	Annual Source Test Bag Leak Detection Systems (BLDS)
SO_2 (as a surrogate for Acid Gases)	CEMS
CO (as a surrogate for Organic HAPS)	CEMS
Mercury	CEMS
Hydrogen Chloride (HCl)	Annual Source Test
Hydrogen Fluoride (HF)	Annual Source Test

17. All source tests shall be conducted in accordance with 40 CFR 63.7 and SC Regulation 61-62.1, Section IV, Source Tests and as required in the "Initial Compliance Requirements" section of this NOMA.

18. The owner/operator shall install, operate, and maintain continuous emissions monitor systems (CEMS) for monitoring and reporting of emissions of CO and mercury.

19. The owner/operator must install, operate, and maintain each CEMS according to the requirements in 40 CFR 63.8 and in paragraphs (a) through (f) of this section.
    (a) Install, operate, and maintain each CEMS according to 40 CFR 63.8(c) and the appropriate Performance Specification in 40 CFR 60, appendix B.
    (b) Conduct a performance evaluation of each CEMS according to the requirements of 40 CFR 63.8 and the appropriate Performance Specification in 40 CFR 60, appendix B.
    (c) As specified in 63.8(c)(4)(ii), each CEMS must complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period.
    (d) Reduce CEMS data as specified in 40 CFR 63.8(g)(2).
    (e) Record the results of each inspection, calibration, and validation check.
    (f) Except for monitor malfunctions, associated repairs, and required quality assurance or control activities (including, as applicable, calibration checks and required zero and span adjustments), the owner/operator must monitor continuously (or collect data at all required intervals) at all times that the affected source is operating.

20. To demonstrate continuous compliance with the SO_2 and CO emission limitations in Table 2, the owner/operator must utilize the CEMS data to calculate and record a 30-day rolling average emission rate on a daily basis. A new 30-day rolling average emission rate is calculated as the average of all of the hourly SO_2 and CO emission data for the preceding

30 operating days. For purposes of calculating data averages, data recorded during periods of monitoring malfunctions, associated repairs, out-of control periods, required quality assurance or control activities must not be used. All the data collected during all other periods in assessing compliance must be used. Any period for which the monitoring system is out of control and data are not available for required calculations constitutes a deviation from the monitoring requirements.

21. For the mercury CEMS, the owner/operator must develop and submit to the Department for approval a unit specific monitoring plan.

22. To demonstrate continuous compliance with the mercury emission limitations in Table 2, the owner/operator shall install, calibrate and maintain a continuous emission monitoring system. Compliance with the mercury emission limitations shall be based on the total mercury emissions from each boiler and total gross MWh from each boiler during the compliance period. The owner/operator shall calculate the mercury emission rate in lb/MWh for each calendar month of the year using hourly mercury concentrations measured by the CEMS and hourly gross electrical outputs. Compliance with the lb/MWh mercury emission limits shall be determined on a 12-month rolling average basis. Compliance with the lb/yr mercury emission limit shall be determined on a 12-month rolling sum basis.

23. A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring system to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions. Any period for which the monitoring system is out-of-control and data are not available for required calculations constitutes a deviation from the monitoring requirements.

24. To demonstrate continuous compliance with the filterable PM_{10}, HCl and HF emission limitations in Table 2, the owner/operator must conduct annual performance tests for filterable PM_{10}, HCl, HF.

25. To demonstrate continuous compliance with the filterable PM_{10} emission limitation in Table 2, the owner/operator must install, calibrate, maintain, and continuously operate a bag leak detection system as specified in paragraphs (a) through (h) of this section.
    (a) Install and operate a bag leak detection system for each exhaust stack of the fabric filter.
    (b) Each bag leak detection system must be installed, operated, calibrated, and maintained in a manner consistent with the manufacturer's written specifications and recommendations and in accordance with the guidance provided in EPA–454/R–98–015, September 1997.
    (c) The bag leak detection system must be certified by the manufacturer to be capable of detecting particulate matter emissions at concentrations of 10 milligrams per actual cubic meter or less.
    (d) The bag leak detection system sensor must provide output of relative or absolute particulate matter loadings.
    (e) The bag leak detection system must be equipped with a device to continuously

record the output signal from the sensor.

(f) The bag leak detection system must be equipped with an alarm system that will sound automatically when an increase in relative particulate matter emissions over a preset level is detected. The alarm must be located where it is easily heard by plant operating personnel.

(g) For positive pressure fabric filter systems that do not duct all compartments of cells to a common stack, a bag leak detection system must be installed in each baghouse compartment or cell.

(h) Where multiple bag leak detectors are required, the system's instrumentation and alarm may be shared among detectors.

Notification Requirements

26. The owner/operator must submit all of the notifications in 40 CFR 63.6(h)(4) and 63.6(h)(5), 63.7(b) and 63.7(c), 63.8(e), 63.8(f)(4) and 63.8(f)(6), and 63.9(b) through (h) that apply to the owner/operator by the dates specified.

27. The owner/operator must submit a Notification of Compliance Status report according to 40 CFR 63.9(h)(2)(ii) and the requirements specified in paragraphs (a) through (c) of this section.

    (a) For each initial compliance demonstration, the owner/operator must submit the Notification of Compliance Status report, including all performance test results, before the close of business on the 60th day following the completion of the performance test and/or other initial compliance demonstrations according to 40 CFR 63.10(d)(2).

    (b) The Notification of Compliance Status report must contain all the information specified in paragraphs (i) through (iv) of this section, as applicable.

        (i) A description of the affected source(s) including identification of which subcategory the source is in, the capacity of the source, a description of the add-on controls used on the source description of the fuel(s) burned, and justification for the worst-case fuel burned during the performance test.

        (ii) Summary of the results of all performance tests, fuel analyses, and calculations conducted to demonstrate initial compliance including all established operating limits.

        (iii) A signed certification that the owner/operator has met all emissions limitations.

        (iv) If had a deviation from any emission limitation, the owner/operator must also submit a description of the deviation, the duration of the deviation, and the corrective action taken in the Notification of Compliance Status report.

28. The owner/operator shall submit notification for the CEMS as required by 40 CFR 63 Subpart A.

Recordkeeping Requirements

29. The owner/operator shall keep records as required by 40 CFR 63 Subpart A.

30. The owner/operator must keep records according to paragraphs (a) through (c) of this section.
    (a) A copy of each notification and report that the owner/operator submitted to comply with this subpart, including all documentation supporting any Initial Notification or Notification of Compliance Status or semiannual compliance report that the owner/operator submitted, according to the requirements in 40 CFR 63 63.10(b)(2)(xiv).
    (b) The records in 40 CFR 63.6(e)(3)(iii) through (v) related to startup, shutdown, and malfunction.
    (c) Records of performance tests or other compliance demonstrations and performance evaluations as required in 40 CFR 63.10(b)(2)(viii).

31. For each monitoring system required by this subpart, the owner/operator must keep records according to paragraphs (a) through (c) of this section.
    (a) Records described in 40 CFR 63.10(b)(2)(vi) through (xi).
    (b) Previous (i.e., superseded) versions of the performance evaluation plan as required in 40 CFR 63.8(d)(3).
    (c) Records of the date and time that each deviation started and stopped, and whether the deviation occurred during a period of startup, shutdown, or malfunction or during another period.

32. The owner/operator records must be in a form suitable and readily available for expeditious review, according to 40 CFR 63.10(b)(1).

33. As specified in 40 CFR 63.10(b)(1), the owner/operator must keep each record for 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record.

34. The owner/operator must keep each record on site for at least 2 years after the date of each occurrence, measurement, maintenance, corrective action, report, or record, according to 40 CFR 63.1(b)(1). The owner/operator can keep the records offsite for the remaining 3 years.

35. The owner/operator shall maintain on file all measurements including continuous monitoring system or monitoring device performance measurements; all continuous monitoring system performance evaluations; all continuous monitoring system or monitoring device calibration checks; adjustments and maintenance performed on these systems or devices; and all other information required in a permanent form.

<u>Reporting Requirements</u>

36. The owner/operator shall submit reports as required by 40 CFR 63 Subpart A.

37. The owner/operator must submit a semiannual compliance report to the Department according to the requirements in paragraphs (a) through (d) of this section.

(a) The first compliance report must cover the period beginning at startup and ending on June 30 or December 31, and lasting at least 6 months, but less than 12 months.
(b) The first compliance report must be postmarked or delivered no later than July 31 or January 31, whichever date comes first after the first compliance report is due.
(c) Each subsequent compliance report must cover the semiannual reporting period from January 1 through June 30 or the semiannual reporting period from July 1 through December 31.
(d) Each subsequent compliance report must be postmarked or delivered no later than July 31 or January 31, whichever date comes first after the end of the semiannual reporting period.

38. The compliance report must contain the information required in paragraphs (a) through (e) and, as applicable, paragraphs (f) through (h).
    (a) Company name and address.
    (b) Statement by a responsible official with that official's name, title, and signature, certifying the truth, accuracy, and completeness of the content of the report.
    (c) Date of report and beginning and ending dates of the reporting period.
    (d) A summary of the results of the annual performance tests and documentation of any operating limits that were reestablished during this test, if applicable.
    (e) If the owner/operator had a startup, shutdown, or malfunction during the reporting period and the owner/operator took actions consistent with the SSMP, the compliance report must include the information in 40 CFR 63.10(d)(5)(i).
    (f) If there are no deviations from any of the emission limitations or operating limits, a statement that there were no deviations from the emissions limitations during the reporting period. A deviation occurs when monitoring data shows exceedance of 112(g) requirements.
    (g) If there were no periods during which a CEMS was out-of-control as specified in 63.8(c)(7), a statement that there were no periods during which the CMS were out-of-control during the reporting period.
    (h) For each deviation from an emissions limitation, the owner/operator must include the information in (i) through (xi). This includes periods of startup, shutdown, and malfunction.
        (i) The date and time that each malfunction started and stopped and description of the nature of the deviation.
        (ii) The date and time that each CEMS was inoperative, except for zero (low-level) and high-level checks.
        (iii) The date, time, and duration that each CEMS was out-of-control, including the information in 40 CFR 63.8(c)(8).
        (iv) The date and time that each deviation started and stopped, and whether each deviation occurred during a period of startup, shutdown, or malfunction or during another period.
        (v) A summary of the total duration of the deviation during the reporting period and the total duration as a percent of the total source operating time during that reporting period.

(vi) A breakdown of the total duration of the deviations during the reporting period into those that are due to startup, shutdown, control equipment problems, process problems, other known causes, and other unknown causes.
(vii) A summary of the total duration of CEMS downtime during the reporting period and the total duration of CEMS downtime as a percent of the total source operating time during that reporting period.
(viii) A brief description of the source for which there was a deviation.
(ix) A brief description of each CEMS for which there was a deviation.
(x) The date of the latest CEMS certification or audit for the system for which there was a deviation.
(xi) A description of any changes in CEMS, processes, or controls since the last reporting period for the source for which there was a deviation.

39. If an action taken by the owner/operator during a startup, shutdown, or malfunction (including an action taken to correct a malfunction) is not consistent with the procedures specified in boilers' startup, shutdown, and malfunction plan, and either boiler exceeds any emission limitation in Table 2, then the owner/operator must record the actions taken for that event and must report such actions within 2 working days after commencing actions inconsistent with the plan, followed by a letter within 7 working days after the end of the event, in accordance with 40 CFR 63.10(d)(5) (unless the owner/operator makes alternative reporting arrangements, in advance, with the Department).

Other Requirements

40. In addition to complying with this MACT determination, the owner/operator shall comply with the electric utility MACT Standard upon promulgation, within the timeframes allowed by 40 CFR 63, Subpart B and SC 61-62.63, Subpart B.

41. The owner/operation shall install equipment associated with the boilers in a manner that should future specific controls for mercury be required, the installed equipment will accommodate e the anticipated space necessary for the future mercury controls.